

# WESTERN GALL RUST



### Introduction

Western gall rust, caused by the fungus *Endocronartium harknessii*, is a very common branch and stem disease of ponderosa and lodgepole pines (Figures 1 & 2). It is a native disease in the western United States and occurs throughout Idaho. Damage is generally more severe in the southern portion of the state. Western white, whitebark, and limber pines are not susceptible to this fungi.



Figure 1: Typical, medium-size gall of western gall rust.



Figure 2: Trunk or "hip" canker on stem of lodgepole pine.

### Biology

The life cycle of western gall rust is relatively simple, producing only two or three spore types without an alternate host to complete its life cycle. In other words, the fungus spreads directly from pine-to-pine.

Yellow to orange blister-like fruiting structures form on the surface of woody branch galls, and more subtly along the margins of trunk cankers, in late spring and early summer (Figure 3). These rupture and release

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windborne spores that infect the green, succulent tissue of expanding pine shoots.



Figure 3: *Sporulating gall.* (Photo by James W. Byler, USDA Forest Service, [www.forestryimages.org](http://www.forestryimages.org))

During certain years, known as “wave years”, the conditions for infection are optimal. Due to the numerous infections that can take place on same-year shoot growth during a wave year, many galls subsequently form on shoots of the same age class or, in time, at the same position on tree stems.

After infection takes place galls begin to form, first as inconspicuous, marble-sized swellings, then continuing to grow each year (perennial structures), sometimes reaching softball-sized proportions. Production of fungus spores from the gall, begins the year after infection occurs and can continue as long as the gall is alive.

Galls located near the end of branches often die from secondary fungi and/or insect infestation. This kills the portion of the branch beyond where the gall was located, causing a “flag”, or dead branch with red foliage, to be visible (Figure 4).



Figure 4. *Shoot dieback distal to western gall rust infections in mature, heavily-infected ponderosa pine.* (Photo by Brennan A. Ferguson, Ferguson Forest Pathology Consulting, Inc.)

## Disease Recognition

Western gall rust is easily recognized and identified because it forms spindle-shaped, oval, or round galls on infected trees (Figure 1). Galls form frequently on branches but may also form on the bole of young trees. When the fungus is fruiting in the early summer, galls can appear bright-yellow to orange over their entire surface and are readily visible. Rodent-feeding is often evident on and around branch galls due to the sugar content of infected tissues. On the main stems of larger trees, galls can continue to develop for many years and form large cankers called trunk or “hip” cankers (Figures 2, 5, & 6). Even though such bole cankers may appear to be composed of dead and dried tissue, inspection of the margins in the spring can reveal small patches of sporulating tissue, proof that the fungus is still active.

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Figure 5: *Lodgepole pine with classic "hip" canker in stem.* (Photo by Susan K. Hagle, USDA Forest Service, [www.forestryimages.org](http://www.forestryimages.org))

## Damage

Mortality, growth loss and defect are the main types of damage caused by severe infections of western gall rust, but their impact varies greatly by locality and tree age. Mortality is most common when seedlings and saplings are infected, but sometimes poles and small saw timber-size trees are killed. Some trees, particularly ponderosa pine, can develop hundreds of branch cankers and suffer growth reductions. **Defect caused by western gall rust is due to trunk cankers** (Figures 5 & 6). Tree stems are frequently weakened where cankers occur and can break off in the wind. Trees with bole cankers in recreation sites or near homes can pose a hazard.

High-value ponderosa pine, such as those around homes or in city parks, can lose aesthetic appeal due to numerous branch galls and the



Figure 6. *Large hip canker in stem of mature ponderosa pine.* (Photo by Brennan A. Ferguson, Ferguson Forest Pathology Consulting, Inc.)

subsequent shoot mortality and branch disfigurement that can occur throughout the crown (Figure 4). Similar damage can be caused, however, by other pine branch and terminal insects and diseases, so diagnosis of such problems must be done with care.

## Management

Removal of infected trees is the only practical way to manage western gall rust. **During commercial harvest, trees with trunk cankers or having more than 25% of their branches infected should be removed.** A moderate number of branch galls should not affect the general health and vigor of a tree.

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## **Stand Regeneration**

Heavily infected trees should not be retained as seed trees because seed production may be reduced. In addition there is a genetic component to susceptibility and infected seed trees are more likely to produce susceptible regeneration. Similarly, seed should not be collected from stands with high levels of western gall rust. Destroy infected nursery and ornamental stock as soon as galls are recognized to minimize disease spread.

During precommercial thinning in ponderosa or lodgepole pine stands infected by western gall rust, the hierarchy for tree removal should be: trees with bole cankers, trees with high numbers of branch cankers, and trees with a moderate number of branch cankers.

Pruning branch galls can reduce risk of new infections, either within the same tree or to surrounding trees, and is practical for high-value trees or groups of trees. Pruning does not need to remove an entire branch on which a gall occurs. Simply prune the branch at the nearest branch-node behind the gall.

Preventative fungicide sprays can be used on high-value trees during the period of spore release in the spring, but treatment likely needs to be repeated twice each growing season in order to keep the tissues of susceptible shoots adequately protected as they expand. Treatment of large trees would best be performed by a commercial applicator who possesses the equipment to apply fungicide properly throughout the crown.

## **Acknowledgements:**

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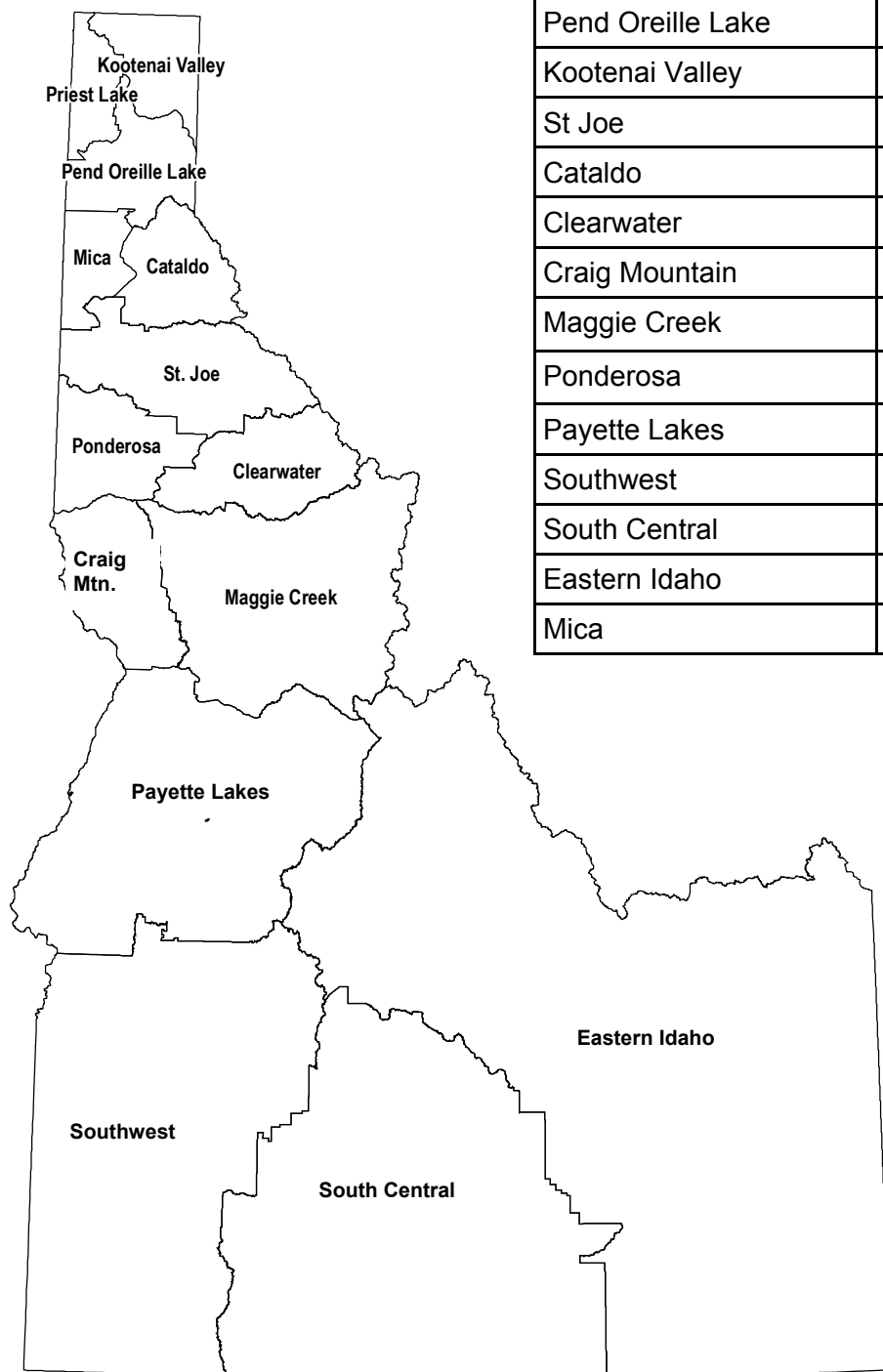
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